

Attachment
9

***Stormwater Flood Management Grant Proposal
City of Palmdale
Water Quality and Other Expected Benefits***

Attachment 9 consists of the following items:

- ✓ **Water Quality and Other Expected Benefits.** Attachment 9 contains details on the Amargosa project's water quality and other expected benefits.

Introduction

This attachment provides information regarding the water quality and other expected benefits that will be derived from the Amargosa Project. Narrative descriptions of the expected water quality and other expected benefits of the project are presented in this attachment. In all cases, quantitative analysis was not feasible; therefore this attachment provides complimentary qualitative analyses.

Project Costs

The total estimated budget for the proposed project is \$13,483,322 (see Attachment 4). Administration, Operations and Maintenance costs are anticipated throughout the project lifetime, in order to maintain the proposed project. Table 9-1 shows the breakdown of the project costs and its net present value in 2009 dollars.

Table 9-1: Total Project Costs

Phase	Cost
Capital Costs	\$13,483,322
O&M and Replacement Costs	\$12,455,000
Total project costs	\$25,938,322
Total present value of discounted costs (\$2009)	\$14,463,689

Water Quality Benefits

The Amargosa Project will provide water quality benefits. These benefits are described in detail below and are summarized in Table 9-2.

Avoided Decline of Drinking Water Supply Quality Due to Arsenic

The Amargosa Project will provide approximately 25,000 AF of additional recharged stormwater and imported water over 50 years. This additional recharged water will prevent migration of arsenic from the lower aquifer to the upper aquifer, a source of drinking water for the region.

All water agencies in the area pump water from the upper aquifer. These agencies include Palmdale Water District, the Los Angeles County Water Works District #40, and over 20 mutual water companies. However, arsenic in the lower aquifer combined with continued groundwater pumping of the upper aquifer could result in the draw on the lower aquifer. The draw of lower aquifer water into the upper aquifer would result in arsenic in the local drinking water supply. Through additional recharge the upper aquifer could

help abate the effects of pumping from the upper aquifer. To the extent that pumping can remain in the upper aquifer, a decline in drinking water quality due to increased levels of arsenic can be avoided.

If the Amargosa Project is not implemented, the 25,000 AF of additional recharged water will not be provided and the benefits of preventing arsenic migration from the lower aquifer will not be realized.

Table 9-2: Water Benefits Summary

Type of Benefit	Assessment Level	Beneficiaries
Avoided decline of drinking water supply quality due to arsenic	Qualitative	Local, Regional

Ecosystem Restoration

The Amargosa Project will provide an ecosystem restoration benefit. This benefit is described in detail below and summarized in Table 9-3.

Riparian Habitat Protection and Enhancement

The Amargosa Project will protect and enhance 25 acres of native habitat in the out-of-channel portions of the project area. The City will clean the area of trash, provide additional plants, and install temporary irrigation to promote establishing newly planted areas. In addition, the City will remove invasive and non-desirable plant species. All new plant species to be added to the site will be native to Amargosa Creek.

The site is expected to support a variety of native bird, mammal, reptile, and arthropod species typical of the desert scrub habitats present. Burrowing nocturnal rodent species such as pocket mice and kangaroo rats; lizards, including the Yucca night lizard; as well as a variety of snakes are present. There is currently a high population of cotton tail rabbits, which have left conspicuous browse lines on the fourwing saltbush shrubs. The bed of Amargosa Creek would serve as a movement corridor for a variety of medium-sized mammals, including coyotes. There is no natural habitat for aquatic or amphibious vertebrates. The restored habitat would be expected to support a rich representation of the wildlife typical of Joshua tree woodland and California juniper woodland habitats as well as saltbush habitats. The riparian woodland, although limited in area, would attract additional species including a variety of migratory and resident songbirds.

If the Amargosa Project is not implemented, the 25 acres of native habitat will not be enhanced or protected and the benefits to native species and the community will not be realized.

Figure 9-1: Example of Vegetation and Local Animals Expected at the Nature Park

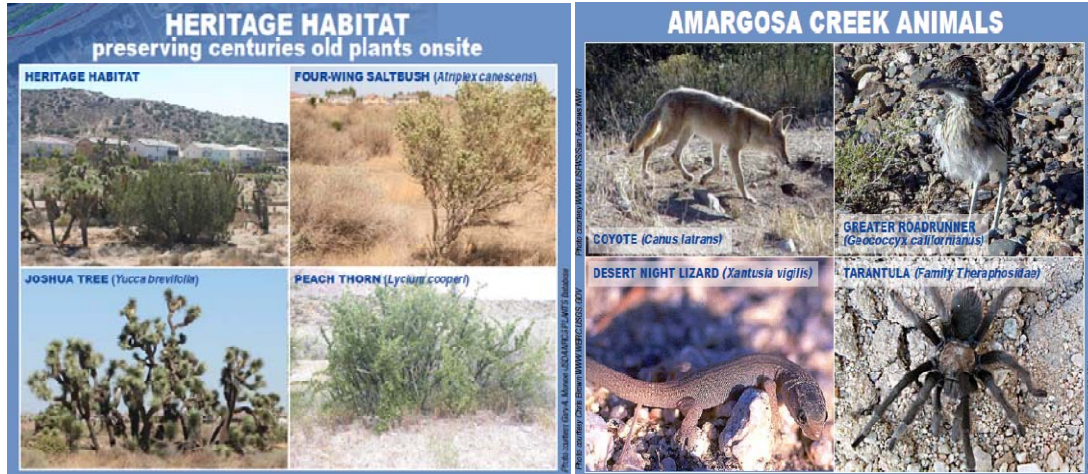


Table 9-3: Ecosystem Restoration Benefits Summary

Type of Benefit	Assessment Level	Beneficiaries
Riparian Habitat Protection and Enhancement	Qualitative	Local, Regional

Recreation and Public Access

The Amargosa Project will provide a recreation and public access benefit. This benefit is described in detail below and summarized in Table 9-4.

Water Conservation Education and Community Recreation

The Amargosa Project will provide a nature park at the recharge facility site that will educate the community about water conservation. The park will be centrally located on the fringe of the urban area, and will be open to the public, with outreach particularly targeting school groups. It will be designed to promote water conservation and will have signs for identification and discussion of native plants and species. Education kiosks will be installed to help promote water conservation. The nature park will have picnic tables and walkways, and a bike path that will connect to existing regional bike paths.

If the Amargosa Project is not implemented, the Nature Park, water conservation education, picnic area, bike paths, and walkways will not be provided and the benefits of these amenities to the community will not be realized.

Figure 9-3: Rendering of Amargosa Creek Nature Park Including Future Education and Community Recreation Structures

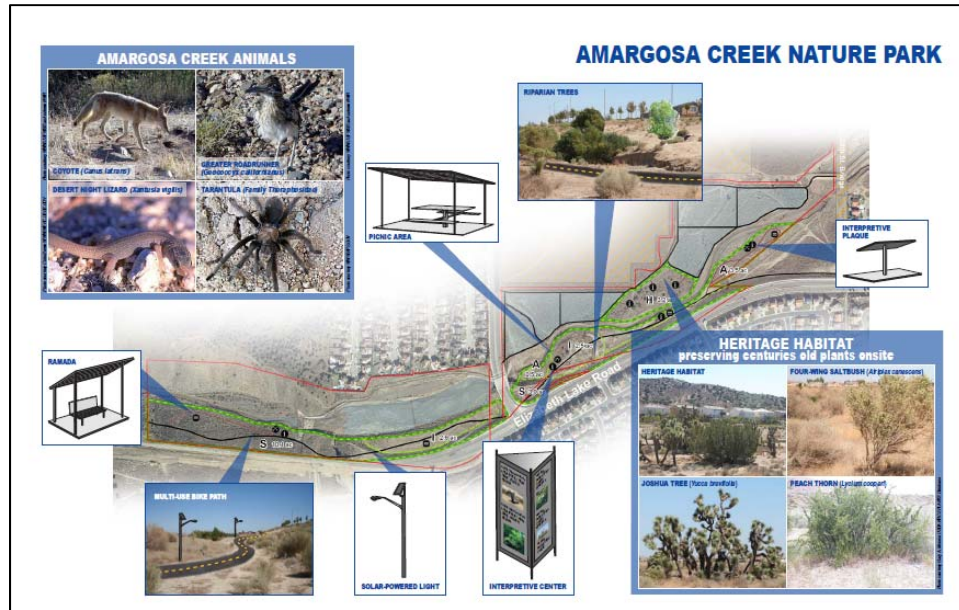


Table 9-4: Recreation and Public Access Benefits Summary

Type of Benefit	Assessment Level	Beneficiaries
Water Conservation Education and Community Recreation	Qualitative	Local, Regional

Other Expected Benefits

The Amargosa Project will provide several other expected benefits. These benefits are described in detail below and summarized in Table 9-5.

Reduced Stress on Bay-Delta During Dry Years/Seasons

The Amargosa Project will offset approximately 25,000 AF of imported water from the Bay-Delta during single dry years. By banking SWP water locally for use during dry years or seasons, the proposed project will help lessen demands on the SWP during critical times. The offset of critical period demands can be left as instream flows in the Bay-Delta, or may offset other diversions that would otherwise reduce flows. Maintaining the Delta's environmental condition is vital to maintaining and improving the viability of the Delta region. Over the 50-year lifespan of the project, this amounts to approximately 125,000 AF of reduced demand on the Bay-Delta during dry seasons.

While salmon runs and wildlife habitat have been improved in recent years, significant problems still exist. The population of certain species of open-water fish, including the delta smelt, has declined dramatically over the past few years. The levee system is aging and concerns about its strength and reliability have escalated since Hurricane Katrina. In addition, water quality problems still exist, and there is little consensus on how to provide management of water resources through storage.

If the Amargosa Project is not implemented, an offset of 125,000 AF of imported water will not be gained and the associated benefits to Bay-Delta levee management, habitats and native species will not be realized.

Aid in Resolving Water Related Conflicts within the Region

In 1999, W.M. Bolthouse Farms, Inc. and Diamond Farming Company initiated lawsuits against various municipal groundwater pumpers within the Antelope Valley, claiming that the ability of agricultural interests to pump groundwater in a cost-effective manner was being impaired due to increased pumping by municipal users¹. In September 2004, the Los Angeles Department of Public Works filed a cross complaint seeking to quantify the rights to groundwater in the Antelope Valley². These complaints resulted in a process called court adjudication to determine, based on data and studies, the equitable allocation of water rights based on water that is available. The court groundwater adjudication process is still underway in the Antelope Valley.

The Amargosa Project will help resolve the groundwater adjudication by providing opportunities to pumpers to store water for dry years and help recharge the aquifer from its overdraft condition. The adjudication process is aggravated by the overdraft condition of the groundwater aquifer and the project helps to alleviate this overdraft by recharging additional stormwater and imported water during wet years. The project would capture water for beneficial uses which otherwise would have evaporated. Additional groundwater supply benefits all the parties to the adjudication, regardless of disputes over pumping rights.

If the Amargosa Project is not implemented, there will be no additional supply benefits provided to the parties of the adjudication process.

Improved Salt Management at Piute Ponds

The Amargosa Project will allow greater control of salt flushing at Piute Ponds. Piute Ponds is a large freshwater marsh located near the terminal end of Amargosa Creek in the Antelope Valley. It consists of claypan ponds and low sand dunes³. Due to the clay laden soils and its location in a closed basin with no outlets to the ocean, evaporation of water at the ponds leaves behind salts that require flushing. Intermittent flows from Amargosa Creek end up at Piute Ponds adding to the problem. Therefore, diverting and recharging stormwater into the underlying aquifer would reduce the volume of salts brought into Piute Ponds and increase salt management control.

If the Amargosa Project is not implemented, there will be no additional flexibility provided to the salt management control efforts at Piute Ponds.

Increased Public Safety

The Amargosa Project would increase the public safety of students that regularly use Amargosa Creek and the surrounding floodplain to reach Highland High School, Cottonwood Elementary School, Summerwind Elementary School, Juniper Middle School, and Ocotillo Elementary School from the nearby neighborhoods to the south. The locations of these schools in relation to the Amargosa Project are shown in Figure 9-4.

¹ Upper Amargosa Creek Recharge Project Environmental Impact Report, SAIC 2009

² Upper Amargosa Creek Recharge Project Environmental Impact Report, SAIC 2009

³ Piute Ponds Site: <http://www.piuteponds.com/history.php>

Figure 9-4: Public Safety Benefits



At present, storm flows from residential and commercial areas northwest of the project site are conveyed through an existing stormwater culvert beneath 25th Street West into Amargosa Creek, discharging near the northwest corner of the property boundary at 25th Street West. According to City staff, students regularly cross near this location. The discharge from the culvert has formed a natural side-channel up to ten feet deep that extends to Amargosa Creek and poses a public safety hazard for students traveling to and from school.

The Amargosa Project would include a 500-foot stormwater conveyance pipe connected to 25th Street West storm culvert moving storm flows away from the area and directly to Amargosa Creek. The project also includes filling in the natural channel. This would prevent further erosion and protect the public safety of pedestrians in the project site. Additionally, flooding on 25th Street West impacts access to Highland High School however the project would armor the river with soilcrete reducing the risk of flooding on 25th street.

If the Amargosa Project is not implemented, the public safety benefits to pedestrians (including local school children) provided by increased flood control at 25th Street West will not be realized. The Other Benefits provided by the Amargosa Project are summarized below in Table 9-3.

Table 9-5: Other Benefits Summary

Type of Benefit	Assessment Level	Beneficiaries
Reduced stress on Bay-Delta during dry years/seasons	Qualitative	Local, Regional
Aid in resolving water related conflicts within the region	Qualitative	Local, Regional
Improved salt management at Piute Ponds	Qualitative	Local, Regional
Increased public safety	Qualitative	Local, Regional

Summary Distribution of Project Benefits and Identification of Beneficiaries

Table 9-6 summarizes the Project's beneficiaries. Local residents and water customers will benefit from flood protection, increased local supplies, more sustainable management of water supplies, protected quality of groundwater in drinking supplies, enhanced and protected native habitat, increased recreational space, and improved educational opportunities provided in the Nature Park kiosks and signage.

Though the City of Palmdale is not an urban water supplier, the City supports this project as beneficial to the Antelope Valley Region. The regional beneficiaries include other municipalities, communities, water districts, and mutual water companies in the general area. These entities will benefit from reduced groundwater overdraft, avoided dry-year reserve water costs, avoided decline of drinking water supply quality due to arsenic contamination from the lower aquifer, enhanced and protected riparian habitat, and increased education opportunities.

The State of California will benefit from reduced stress on the Bay-Delta during dry years.

Table 9-6: Project Beneficiaries Summary

Benefits	Local*	Regional**	Statewide***
Protection of Buried Utilities from Erosion	✓		
Protection of Streets and Roadways from Flooding	✓		
Protection of Public Safety	✓		
Reduced Groundwater Overdraft	✓	✓	
Avoided Dry-Year Reserve Water Costs	✓	✓	
Avoided Decline of Drinking Water Supply Quality due to Arsenic	✓	✓	
Riparian Habitat Protection and Enhancement	✓	✓	
Increased Water Conservation Education with New Nature Park	✓	✓	
Reduced Stress on Bay-Delta During Dry Years/Seasons			✓

* Includes: City of Palmdale

** Includes: Los Angeles County Water Works District #40, City of Lancaster, Quartz Hill, Rosamond, Antelope Acres, and other surrounding communities

*** Includes: State of California

Project Benefits Timeline Description

The Amargosa Project will provide benefits over an assumed 50-year project lifetime. Benefits from the project will begin accruing as soon as the recharge facilities are constructed in 2013. For additional detail on the timeline for project benefits, see Attachment 5.

Uncertainty of Benefits

Uncertainties relating to the flood reduction benefits of this project are summarized below in Table 9-7. Uncertainties include the inherent unpredictability of rainfall patterns, fluctuations in the availability of imported water, variability in repair frequency for erosion damages, and uncertainty in the regulatory process.

Table 9-7: Uncertainty of Benefits

Benefit or cost category	Likely impact on net benefits	Comment
Aid in resolving water related conflicts within the region	+/-	The uncertainty inherent in this project could have a net positive or negative impact on the benefits. Rainfall/SWP availability could be more or less than predicted. Erosion damages could occur more or less frequently than predicted. Regulatory requirements could evolve in such manner as to be more difficult or more streamlined.

**Direction and magnitude of effects on net benefits

- + Likely to increase net benefits relative to quantified estimates
- ++ Likely to increase net benefits significantly
- “-“ Likely to decrease net benefits
- “--“ Likely to decrease net benefits significantly
- +/- Uncertain

Potential Adverse Effects from the Project

Any potential short-term impacts, such as potential harmful effects of removing land from the floodplain, associated with project construction will be mitigated as described in the EIR, in Appendix B. No long-term adverse effects are expected as a result of the proposed project.

Qualitative Benefits Summary

The project will result in many benefits that are not directly related to flood damage reduction costs or water supply. Those benefits include water quality benefits, riparian habitat protection and enhancement, water conservation education and community recreation, reduced stress on Bay-Delta during dry years/seasons, aid in resolving water related conflicts within the region, improved salt management at Piute Ponds, and increased public safety. Table 9-8 lists each benefit and gives a qualitative indicator of the likely impact on the overall net benefit from the project.

Table 9-8 Qualitative Benefits Summary

Benefit	Qualitative Indicator*
Avoided decline of drinking water supply quality due to arsenic	+
Riparian habitat protection and enhancement	++
Water conservation education and community recreation	+
Reduced stress on Bay-Delta during dry years/seasons	+
Aid in resolving water related conflicts within the region	+
Improved salt management at Piute Ponds	+
Increased public safety	+

**Direction and magnitude of effects on net benefits

- + Likely to increase net benefits relative to quantified estimates
- ++ Likely to increase net benefits significantly
- Likely to decrease net benefits
- “--“ Likely to decrease net benefits significantly
- +/- Uncertain

Summary of Project Benefit Costs

The total present value of the project cost, along with monetized and qualitative benefits, is provided in Table 9-9.

Table 9-9: Benefit-Cost Analysis of Water Quality and Other Expected Benefits Overview

	<u>Present Value</u> <u>(\$2009)</u>
Costs – Total Capital and O&M	\$13,483,322
Monetizable Benefits <i>None</i>	N/A
Total Benefits <i>None</i>	N/A
Qualitative Benefits	<u>Qualitative Indicator*</u>
Water Quality <i>Avoided decline of drinking water supply quality due to arsenic</i>	+
Other Benefits <i>Riparian habitat protection and enhancement</i>	++
<i>Water conservation education and community recreation</i>	+
<i>Reduced stress on Bay-Delta dry years/seasons</i>	+
<i>Aid in resolving water related conflicts within the region</i>	+
<i>Improved salt management at Piute Ponds</i>	+
<i>Increased public safety</i>	+
Total Benefits	\$0

**Direction and magnitude of effects on net benefits

- + Likely to increase net benefits relative to quantified estimates
- ++ Likely to increase net benefits significantly
- “-“ Likely to decrease net benefits
- “--“ Likely to decrease net benefits significantly
- +/- Uncertain

Economic Benefit Tables

All benefits described in this attachment are qualitatively assessed; therefore there was no quantification of the water quality and other expected benefits.